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DEFENSE INTELLIGENCE AGENCY

DEFENSE INTELLIGENCE PROJECTIONS FOR PLANNING

PEOPLES REPUBLIC OF CHINA [redacted]

SPACE SYSTEMS FOR THE SUPPORT OF MILITARY OPERATIONS (U)

APRIL 1978

NATIONAL SECURITY INFORMATION
Unauthorized Disclosure Subject to Criminal Sanctions

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DEFENSE INTELLIGENCE PROJECTIONS FOR PLANNING (DIPP)
PEOPLES REPUBLIC OF CHINA

SECTION V
SPACE SYSTEMS FOR THE SUPPORT OF MILITARY OPERATIONS
DDE-1400-5-78

This DIPP Section has been coordinated with the Intelligence Chiefs of the Army, Navy, Air Force, and Marine Corps and with the National Security Agency. All concur in the DIPP Section as written.

The Central Intelligence Agency has reviewed this Section and is in broad agreement with it.

Comments or questions should be referred to the author,

[redacted]

FOR THE DIRECTOR:

JAMES A. WILLIAMS
Brigadier General, USA
Deputy Director for Estimates

~~SECRET~~

DEFENSE INTELLIGENCE PROJECTIONS FOR PLANNING (DIPP)

PEOPLES REPUBLIC OF CHINA (PRC)

MILITARY FORCES

SECTION V
SPACE SYSTEMS FOR THE
SUPPORT OF MILITARY OPERATIONS
DDB-1400-5-78
MARCH 1978

INTELLIGENCE CUTOFF DATE: 1 MARCH 1978

PRC DIPP SECTION V DATED 1 MARCH 1977
IS HEREBY SUPERSEDED

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SECTION V

SPACE SYSTEMS FOR THE SUPPORT OF MILITARY OPERATIONS

EXECUTIVE SUMMARY

(S) *China's space program remains in the developmental stage. Of their 12 space launches attempted through January 1978, 8 have been successful.* [redacted]

(S) *Although we have some information on Chinese intentions in space, there remains considerable uncertainty on the scope of PRC space systems development. Among the military-related space programs, reconnaissance satellites are receiving priority. Communications satellites are believed to be second in priority. Other space programs such as meteorology, navigation, earth resources, and scientific satellites will likely receive less emphasis through the 10-year period of this projection.*

(S) [redacted] *During the period of this estimate, we also anticipate they will develop effective solar energy power cells for their satellites, and will acquire the capability to produce improved space launch boosters that will enable them to launch satellites into highly elliptical or geostationary orbits.*

(S) *The Best Estimate forecasts a launch rate of 15 satellites per year by 1988. Over half of these will be reconnaissance satellites with the remainder dedicated to communications, meteorology, navigation, and scientific missions.*

DEFENSE INTELLIGENCE PROJECTIONS FOR PLANNING, PRC

SECTION V: SPACE SYSTEMS FOR THE SUPPORT OF MILITARY OPERATIONS

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INTRODUCTION

Purpose

(S) The PRC volume of Defense Intelligence Projections for Planning (DIPP) is intended to assist the planner by projecting Chinese military forces 10 years into the future. The DIPP is produced by DIA with the participation and assistance of NSA and the intelligence staffs of the military services. Projective entries in the DIPP which correspond in assumptions, methodology, and level of detail with those in national issuances are reviewed by CIA to the extent permitted by manpower availability, and a coordination statement to that effect is included in the appropriate DIPP sections.

(S) The Secretary of Defense has requested that elements of the Department of Defense use the DIPP as the starting point for any required projections of foreign forces in military planning. The DIPP is intended as an elaboration of -- not a replacement for -- National Intelligence Estimates, Defense Intelligence Estimates, and other joint military intelligence estimates. DIPP projections in general quantify the broader judgments contained in these estimates, frequently elaborate on their judgments, occasionally project forces and systems in more detail than do these estimates, and may even project developments not indicated by existing evidence. The DIPP is updated as required by new intelligence or by new judgments.

Organization

(S) The PRC DIPP is organized into six sections (see outline, page xi). The first five sections describe individual groups of forces and systems which together are intended to accomplish an identifiable mission; i.e., Ballistic Missile Forces, Strategic Bomber Forces, Aerospace Defense Forces, General Purpose Forces, and Space Systems for the Support of Military Operations. The last section quantifies the nuclear aspects of the Chinese military effort.

Constraints

(S) Projections of forces and systems depend heavily on extrapolations of observed activity. This is because of the dearth of reliable information on PRC planning for future military forces, especially quantitative planning. Modern collection systems alleviate some of the uncertainty by providing reliable information on such activities as testing, training, and deployment. Observed activity, however, typically reflects decisions involving the next two years or so. For longer periods, there is progressively greater uncertainty, as evidence becomes more fragmentary and less definitive. Projections beyond four or five years become

somewhat speculative and rely heavily on assumptions, imputed requirements, feasibility studies, and intuition tempered by experience. Moreover, in projecting systems and combat materiel, we are constrained by what is technologically feasible and by what is realistic in the light of PRC production capacity. It is obviously extremely difficult to project with confidence, much less with precision, over the next five to 10 years.

Assumptions

(S) In light of the constraints just described, it is necessary to place some arbitrary limits on the range of uncertainty in preparing quantitative projections by assuming certain conditions for the period of the projections. The following are general assumptions that apply to all PRC DIPP projections and mixes (these assumptions may be supplemented by particular assumptions or rationale to justify particular projections or mixes):

a. The PRC will not be involved in a general war during the period.

b. There will be no limited war or crisis involving major powers that would cause unforeseen changes in the posture of Chinese forces.

c. No arms control agreements will be signed by the PRC.

d. There will be no technological breakthrough which would rapidly alter Chinese military capabilities and postures relative to other major powers.

Methodology

A. General

(U) The technique used in preparing the DIPP is to use the best available documentary intelligence and the best available expertise in arriving at a firm estimative position and then, as appropriate, to describe or bound the limits of uncertainty inherent in the projections. Force level figures reflect midyear estimates.

B. Multiple Mixes

(S) Since there are many factors bearing on potential future developments, we develop three projections or mixes -- a High Projection, a Low Projection, and a Best Estimate. The High and Low Projections indicate that the Chinese may exert a greater or lesser effort in regard to the type of force or family of systems in question, that it will be a more effective or less effective (but not necessarily more numerous or less numerous) force or family of systems than projected in the Best Estimate. Between these two outside limits of probability, we provide for the planner a projection which appears most plausible in the light of available

evidence; this is the Best Estimate. We believe that there are three chances out of four that the correct quantity will fall within the entire spectrum of possibility encompassed by the High and Low Projections. Moreover, we attempt to describe with some specificity the factors and trends which would result in each projection or mix; i.e., we describe assumptions in addition to the four basic DIPP assumptions outlined above. Finally, since it is most unlikely that either all the High Projections or all the Low Projections of forces and systems will prove out for any given year, it would be misleading to use either all the High Projections or all the Low Projections for planning purposes, or even for systems analysis and war gaming applications. It is important to note that each projection (High, Low, Best) is based on different detailed assumptions and is designed to be considered as a whole. Thus, extracting figures for one or more systems from one projection and combining them with figures from another projection would negate the analysis behind the High Low-Best approach

C. Line Entries

(U) New as well as postulated weapon systems are included in force projections when the chances are at least even that they will be deployed. When a weapon system is an important, feasible, but unlikely addition to PRC forces during the 10-year projection period, the system is described in general terms in the accompanying text but is not quantified in the tables.

D. Expressions of Probability

(U) While we recognize that the DIPP contains various types of uncertainty, we have as a practical matter used one basic method for expressing uncertainty -- percentage statements of probability. These percentage statements (e.g., "80 percent chance") are provided at the point at which an important judgment is made in the text. These percentages are consistent with probability quantifications of the old "Kent Chart," which no longer appears on the inside cover of each DIPP section. In order to avoid a profusion of probability levels that would unjustifiably give an impression of precision, we have limited the percentages used to intervals of 10. (The High Low spread that covers aggregate force level figures will, however, continue to be on the order of three chances out of four, or 75 percent.

Synopsis

(S) DIPP tables are thus quantifications of intelligence estimates. The format of the tables may vary with the particular substantive problem or family of forces and systems. However, all projections are intended to assist the planner by communicating an agreed military intelligence position; they recognize and bound uncertainty, but without giving the planner such a broad spectrum of projections that he would be confused rather than informed.

DEFENSE INTELLIGENCE PROJECTIONS FOR PLANNING

(DIPP)

PRC MILITARY FORCES · TEN YEAR PROJECTIONS

Outline

INTRODUCTION

SECTION I · Ballistic Missile Forces

- IA · Intercontinental Ballistic Missile Forces
- IB · Short-, Medium-, and Intermediate-Range Ballistic Missile Forces
- IC · Submarine-Launched Ballistic Missile Forces

SECTION II · Strategic Bomber Forces

SECTION III · Aerospace Defense Forces

- IIIA · Air Defense Surveillance and Control Forces
- IIIB · Interceptor Forces
- IIIC · Surface-to-Air Missile Forces
- IIID · Antiaircraft Artillery (AAA) Forces

SECTION IV · General Purpose Forces

- IVA · Ground Forces
- IVB · General Purpose Naval Forces
- IVC · Tactical Air Forces
- IVD · Military Transport Aviation Forces

SECTION V · Space Systems for the Support of Military Operations

SECTION VI · Nuclear Implications

(This page is ~~CONFIDENTIAL~~)

Note to Users

Probability Treatment. The DIPP, by virtue of being a comprehensive document, contains several different types of uncertainty. The major uncertainty -- that relating to aggregate force level figures -- has been treated probabilistically for a number of years (as noted in the "Methodology" portion of the DIPP Introduction). Basically, the approach is to design the High-Low spread in such a manner that there are roughly three chances out of four that the actual quantity will fall within the estimated parameters.

In response to consumer requests, the DIPP now explicitly quantifies other types of uncertainty as well. A DIPP section, for example, could contain uncertainty expressions on such things as enemy intentions, levels of investment, utilization of force components, and so on. Of particular significance are the uncertainties associated with individual systems; e.g., the chances of a system actually appearing, its characteristics and performance capabilities, and the timing of its introduction into the operational force.

While we have conceptually differentiated various types of uncertainty, we have as a practical matter used one basic method for expressing uncertainty -- percentage statements of probability. These percentage statements (e.g., "80 percent chance") are provided at the point at which an important judgment is made in the text. These percentages are consistent with probability quantifications of the old "Kent Chart," which no longer appears on the inside cover of each DIPP section. In order to avoid a profusion of probability levels that would unjustifiably give an impression of precision, we have limited the percentages used to intervals of 10. [The High-Low spread that covers aggregate force level figures will, however, continue to be on the order of three chances out of four, or 75 percent.]

Metric Usage. Parameters and measurements in the DIPP are reported in metric units, to bring Department of Defense intelligence reporting into consonance with internationally accepted standards for measurement. A discussion of metric usage in the DIPP and a metric conversion table are provided in Appendix A.

DEFENSE INTELLIGENCE PROJECTIONS FOR PLANNING, PRC

SECTION V: SPACE SYSTEMS FOR THE SUPPORT OF MILITARY OPERATIONS

GENERAL

1. (S) China's space program remains in the developmental stage. Their first satellite was placed into orbit in April 1970. Of the 12 space launches attempted through January 1978, 8 have been successful. [redacted]

MISSION/ORGANIZATION

2. (S) Mission. We believe the primary mission of China's space program is the support of military operations. Non-military space applications are of secondary importance. Among the military-related space programs, reconnaissance satellites [redacted] are receiving priority. The first objective of the reconnaissance program is the enhancement of China's military posture through the acquisition of targeting, warning, and technical intelligence on the Soviet Union. As the Chinese develop newer systems with longer operational life spans and greater collection capabilities, we expect to see some redirection of this space collection effort to other areas of the world of strategic importance to China, i.e., the United States, Europe, Africa, other Pacific countries, and India. Communications satellites (COMSATs) [redacted] will, in all likelihood, support both military and civilian objectives with primary emphasis on maintaining peacetime continuity among national, civil, and military command and control communications. Other space programs such as meteorological, earth resources, and scientific satellites will likely receive less emphasis through the period of this projection. Positive by-products of China's space program will be increased prestige, particularly in the Third World, and expanded knowledge of previously inaccessible areas for potential military, diplomatic, or economic exploitation.

3. ~~(S/NOFORN)~~ Organization. The Chinese space systems R&D program is believed to be under the direct control of the Military Commission of the Chinese Communist Party Central Committee (CCPCC). Management and supervision is provided by

the Ministry of National Defense (MND) in Peking through the National Defense Scientific and Technological Commission (NDSTC) in coordination with the Chinese Academy of Sciences (CAS). The NDSTC is responsible for the military programs while the CAS oversees the purely scientific space research activities. It is evident that the Chinese have placed a high priority on the development of military-related space systems; and we believe that the trade-off decisions establishing the priorities for military space systems R&D vis-a-vis other military programs are made by the Military Commission of the CCPCC.

4. (S) Launch Facilities. The Shuang-Ch'eng-Tzu Missile Test Center (SCTMTC) has served as the launch facility for all of the PRC's space launches. However, there is evidence of construction of a new pad at the Wu-Chai missile test facility that could be space-launch related. We also expect development of a space-launch capability in southern China to support geostationary launches (75 percent chance). Although space launches could take place from these areas in the future, the SCTMTC is likely to remain China's primary space-launch center for the next 10 years. We expect some upgrading of launch facilities during the period in order to improve SCTMTC's space-launch capabilities. In fact, we suspect that ongoing modifications to Pad B-1 at SCTMTC may be space-launch related. (See Figure 1).

5. (S/NOFORN/WNINTEL) Space Tracking Facilities. The PRC has missile- and space-tracking stations of various sizes and capabilities located throughout China. There are, as yet, no seagoing vessels identifiable as dedicated missile- or satellite-tracking platforms, although two ships currently under construction may have that mission. A number of scientific and research ships are capable of providing communications support to a space event [redacted]. The Chinese can be expected to expand both the number and sophistication of internal space-tracking stations during the period of this projection. Dedicated missile- and space-tracking oceangoing ships probably will become operational, and the Chinese additionally may consider the establishment of ground-tracking stations abroad for the monitoring of space events.

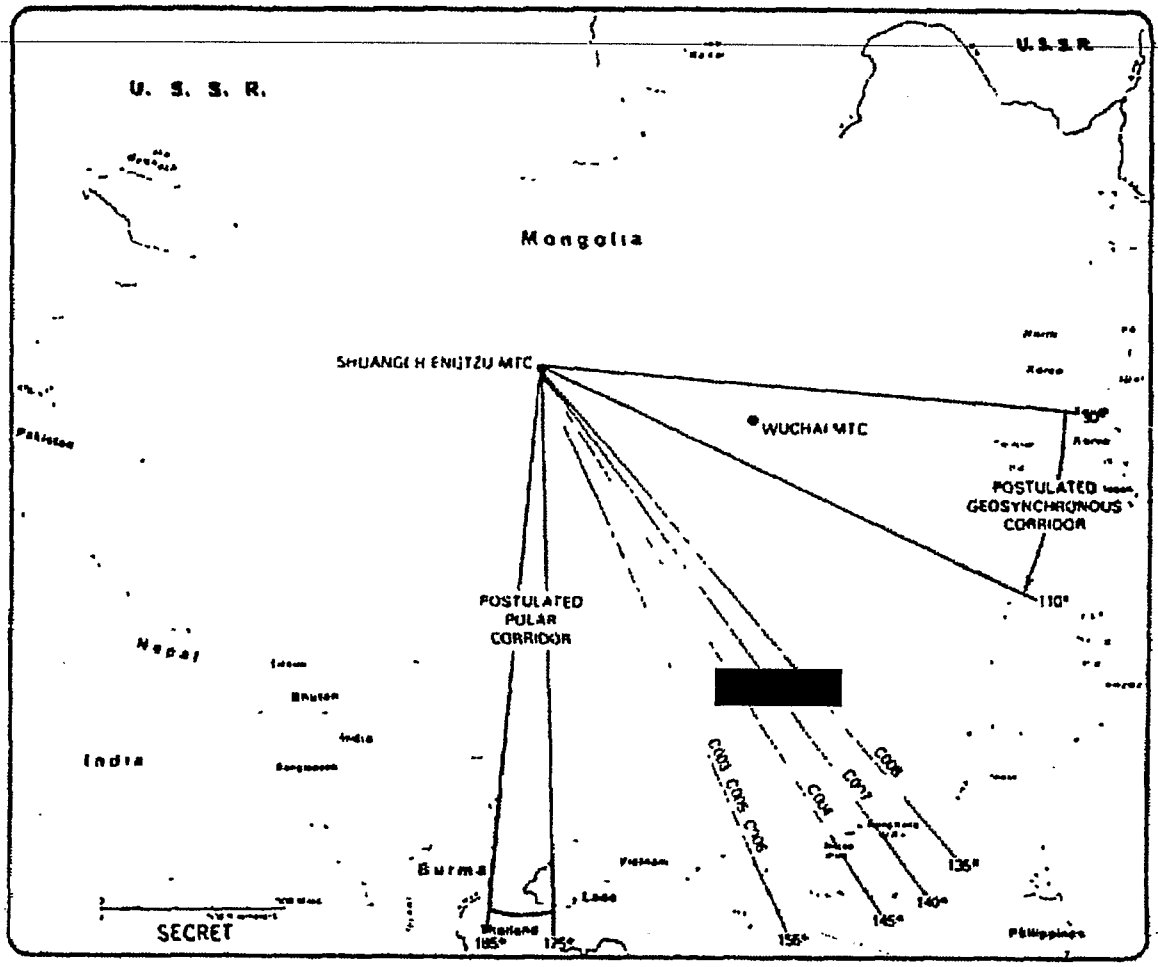


FIGURE 1. SPACE LAUNCH CORRIDORS FROM SCTMTC (U)

SYSTEMS AND EQUIPMENT

Space Launch Vehicles

6. (S) The CSL-1, used to launch China's first two satellites, is a three-stage booster that uses the CSS-3* for the first two stages. [redacted]

*See PRC DIPP, Section IA, Intercontinental Ballistic Missile Forces, for data on the CSS-3 and CSS-X-4 ICBMs.

[redacted] the CSL-1 is assessed to be capable of launching a maximum payload of about 700 kg into a 185 km (100 NM) circular orbit. This vehicle has not been used in the space program since 1971.

7. (S) The CSL-2 is a two-stage booster based on the CSS-X-4 ICBM.* This vehicle was used to launch China's last six satellites. The CSL-2 is assessed to be capable of placing about 3,850 kg into a 185 km circular orbit.

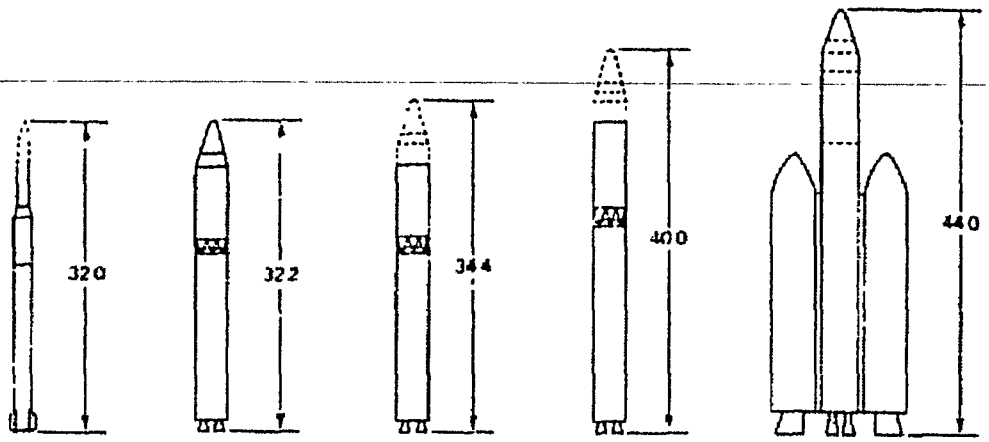
8. (S) China's current launch vehicles are adequate for most near earth orbit developmental and reconnaissance satellite systems. However, the capability to launch heavier payloads and to place satellites into 12-hour elliptical or geostationary orbits is restricted by the limitations inherent in the CSL-1 and CSL-2. Since an effective operational COMSAT program would require placing satellites in such orbits, we judge the Chinese will pursue improved space-launch vehicles. Several alternatives are available for achieving the necessary booster capability. One approach would be the development of a new liquid space booster based on the Postulated Large ICBM which is projected for the mid-1980's.** Although this intercontinental ballistic missile (ICBM) could have improved accuracy and reliability, it would not provide the additional lift capability needed for future space missions.

9. (S) The more likely approach to increasing booster capabilities, in the short term, is the addition of a third stage and possibly a fourth to the CSL-2. There is a 75 percent chance that a three-stage modified CSL-2, designated the Postulated CSL-X, will be operational in 1979-1980. This booster with an added restart capability would give the Chinese the capability for a 12-hour elliptical orbit. The Chinese would likely add a restartable fourth stage to the CSL-X in order to place a satellite into geostationary orbit from the SCTMTC.

10. (S) In order to place large satellites in geostationary orbit and very heavy payloads in low circular orbits, it will be necessary for the Chinese to develop a large booster

See PRC DIPP, Section IA, Intercontinental Ballistic Missile Forces, for data on the CSS-3 and CSS-X-4 ICBMs.

**For further discussion of this system see PRC DIPP, Section I, Ballistic Missile Forces.*



	CSL 1	CSL 2	CSL X (THREE STAGE CSL 2)	CSL X (FOUR STAGES)	LARGE BOOSTER (FOUR STAGES)
BOOSTER IOC	1970	1975	1979	1982 1983	1988 1990
BOOSTER STATUS	INACTIVE	OPERATIONAL	PROJECTED	PROJECTED	ESTIMATED
PAYLOAD (kg)	700*	3850*	5,450*	225**	11,340*/900**
PROPELLANTS	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID/SOLID

* 185 KM CIRCULAR ORBIT OPTIMUM INCLINATION
** GEOSTATIONARY ORBIT OPTIMUM INCLINATION

SECRET

FIGURE 2. CURRENT AND PROJECTED PRC SPACE LAUNCH VEHICLES (U)

in the late 1980's. This system is estimated to be a building block variant of the CSL-X or the Postulated Large ICBM using add-on solid boosters. (See Figure 2).

Satellite Systems

11. (S) The Chinese do not yet have any operational satellite systems. [redacted] the PRC's eight satellites [redacted] all have been R&D vehicles (see Chart 1).

CHART 1

SATELLITE LAUNCH HISTORY

Launch Date	ESV Designator	Inclination (deg)	Apogee (km)	Perigee (km)
24 Apr 70	C001	68.5	2,384	439
3 Mar 71	C002	69.9	1,837	272
18 Sep 73	-	-	-	-
12 Jul 74	-	-	-	-
5 Nov 74	-	-	-	-
26 Jul 75	C003	69	468	185
26 Nov 75	C004	63.2	483	17[illegible]
16 Dec 75	C005	69	398	191
30 Aug 76	C006	69	2,146	196
10 Nov 76	-	-	-	-
7 Dec 76	C007	59.4	485	164
26 Jan 78	C008	57.1	484	170

[redacted]

12. ~~(S/NOFORN/WNINTEL)~~ Reconnaissance Developmental Systems.

[redacted] All [redacted] satellite systems exhibited a short active lifetime -- a limiting factor to intelligence collection. Future systems will likely be of longer duration.

13. (S) Future Satellite Systems. Despite the very few PRC space launches to date, there is some information available on Chinese intentions in space. There remains, however, considerable uncertainty on the scope of PRC space systems development. We believe that the Chinese are working on the following satellite systems.

14. (S) Photoreconnaissance. [redacted] Although the PRC has imported some space-related photographic equipment and technology, the Chinese will probably rely on their own capabilities to manufacture camera systems for photoreconnaissance satellites. We believe there is an 80 percent chance that they will have an operational, low resolution (3-5 m) photoreconnaissance satellite system for general search and mapping purposes within the next 2 years. We expect that the Chinese will subsequently build on their experience with this initial low resolution system and be able to develop in the early- to mid-1980's an improved low resolution (2-4 m) system for search and surveillance and a high resolution system (1-2 m) for scientific and technical collection.

15. (S) ELINT Reconnaissance. [redacted] Development of an ELINT satellite capability will enable the Chinese to collect data on radars located beyond the range of their existing ELINT collection means. In terms of time and resource investment, they could develop an operational ELINT satellite system more easily than a photoreconnaissance system but the chances are better than even that the Chinese will give development priority to photographic systems. This judgment is based on our assessment of China's probable intelligence requirements and priorities versus their present collection capabilities. Nevertheless, we assess that they have the technological and production capability to develop both systems concurrently, and we judge there is about an 80 percent chance that an ELINT satellite will be operational by 1979. Improvements [redacted] will probably occur continually throughout the 10-year projection period.

16. (S) International Communications. The PRC, which became a full member of the International Telecommunications Satellite (INTELSAT) Corporation in 1977, has five ground terminals capable of operating within the INTELSAT network. One of these terminals was supplied by the Japanese to provide direct communications between Tokyo and Peking using Pacific Ocean INTELSAT IV satellites. The other four US-supplied terminals are located (two each) in Peking and Shanghai. One terminal at

each of these two locations operates with the Pacific Ocean satellites while the second functions in the Indian Ocean network. Based on their present limited international telecommunications requirements, the Chinese now lease less than 50 INTELSAT circuits. We expect this will increase to over 200 circuits during the next 10 years as their need for additional international communications channels increases -- and the capacity of their domestic telecommunications system expands to permit them to handle the larger volume. We believe there is only a 20 percent chance that the Chinese will attempt to develop or launch any of their own satellites for international communications during the next 10 years.

17. (S) Domestic Communications. The Chinese appear to be intent upon improving their internal communications system by developing COMSATs. They already have deployed parabolic antennas at over 30 ground stations in China that would be suitable for use with a COMSAT network. Furthermore, the Chinese have announced their intent to launch two experimental geostationary COMSATs in the 1979-1980 time frame. We believe that the PRC has the capability to design a satellite communications system based on 1960's U.S. technology and that, if the announced 1979-1980 launch occurs, the satellite will be a Chinese-designed experimental platform. Although China has not demonstrated the capability to place a satellite into a geostationary orbit, development of the CSL-X with a restartable third or fourth stage is judged to be within China's capability by 1979-1980. There is a 60 percent chance that a COMSAT system utilizing a Chinese-designed satellite will become operational by 1982. However, the Chinese continue to express interest in the purchase of a state-of-the-art communications satellite from the West. If such a purchase were made, and we believe the chance is small, China could achieve an operational COMSAT system by 1980 when their appropriate space launch vehicle is available. The initial domestic communications satellite circuits probably will be dedicated to military and government use.

18. (S) Meteorological. The PRC has indicated a strong interest in the development of meteorological satellites, and the acquisition of such a capability would be of obvious value to a heavily populated and agriculturally-based nation like China. Weather data for the support of military operations is also of obvious value. However, a good deal of meteorological data is readily available from a variety of international

sources including NASA's meteorological satellites, and it is almost certainly cheaper for the Chinese to obtain this data from foreign sources than to develop their own dedicated meteorological satellite network. Considering China's limited space program resources and the easy availability of worldwide weather data, we expect the Chinese will not implement an operational meteorological satellite program until about 1983. We expect to see a few R&D meteorological satellite launches prior to this time, and have included these under R&D/scientific launches in Table V-1.

19. (S) Navigational. China currently uses international satellite navigational systems as well as the LORAN systems. We believe that access to such navigational data is not only sufficient for China's present needs, but probably will remain so for most, if not all, of the period of this projection. The Chinese must, of course, be aware that these international systems would become unavailable to them during wartime and because precise navigational information would be necessary to support an operational ballistic missile submarine force, it is most desirable for them to have their own dedicated satellite network. We estimate that China could launch dedicated navigational satellites coincident to the IOC of their initial nuclear ballistic missile submarine (SSBN) system but will not do so until the mid-1980's when their SSBN force is estimated to be of sufficient size to warrant the commitment of space resources to such an effort.* Precise geodetic data is essential to more accurate ICBM/SLBM targeting. As we expect the Chinese will attempt to improve the systems effectiveness and accuracy of their strategic missile systems during the period, we would therefore also expect them concurrently to investigate development of a geodetic capability with their navigation satellites. The Chinese will, in the interim, continue to rely primarily on existing international navigation/geodetic systems. We believe the chances are slightly better than even that the Chinese will develop such a capability and that a geodetic payload would be packaged in a combined navigational/geodetic satellite becoming operational about 1985.

20. (S) Other Satellites. Other orbital systems are technically feasible for the Chinese to develop. These include such systems as warning satellites, nuclear detection systems,

*See PRC DIPP, Section IC, Submarine-Launched Ballistic Missile Forces.

ocean surveillance systems, deep space or lunar probes, manned space vehicles and defensive/offensive space weapons. However, due to resource constraints and the priority of other space programs, we believe these systems will not become operational during the 1980's and none are forecast.

FORCE LEVELS

21. (S) General Considerations. The Chinese have no operational military space systems. Their military-related space programs are still in the research and development stage.

22. (S) Force Modernization Considerations. The pace of future progress on military space systems and the resultant capabilities will depend on a variety of factors and circumstances. These will include R&D and production costs and the resultant trade-offs with other programs, China's technological progress in the development of satellite systems and boosters, acquisition of foreign technology, the availability of alternate means of satisfying their data collection requirements, and most importantly, political events and decisions impacting on the space program as a whole.

Alternative Forces

23. (S) The Best Estimate projects a continuation of the slow pace displayed by the Chinese to date and forecasts a modest space program throughout the 1980's. This projection assumes a relatively stable economic growth at current levels and a gradual improvement in military capabilities consistent with balanced economic development. A gradual increase in both the number and type of satellites launched is projected as the economic base improves, technical problems are overcome, and the Chinese gain experience.

24. (S) The Low Projection represents a slower, more limited space program resulting from greater economic, technological, and/or political constraints. A leadership decision to implement more rapid internal economic development at the expense of military programs would see less funding for overall force modernization, including space programs. Alternatively, a decision within the military itself to concentrate on the pursuit of lower technology weapons systems versus the development of sophisticated programs such as reconnaissance satellites would result in cutbacks in the space program. Finally, this projection

could also result if the Chinese encounter serious technical difficulties with either the satellite systems or the launch boosters, or they are unable to acquire or exploit the requisite technology from the West.

25. (S) The High Projection portrays a high investment effort and a higher priority still for space programs. It assumes allocation of resources, acquisition of advanced space technology from abroad, and earliest possible success with current and follow-on programs. Given however, China's political, economic, and technological environment, and the apparent objectives of the new leadership, we believe that this course is less likely.

CHART 2

KEY DATES IN THE FORCE PROJECTIONS

Satellite System	Postulated Initial Operational Dates		
	Best Estimate	Low Projection	High Projection
Photo Resolution			
Low	1979	1981	1978
Improved Low	1983	1985	1980
High	1985	1987	1981
ELINT	1979	1980	1978
Communications (Domestic)	1982	1985	1980
Meteorology	1983	1988	1980
Navigation/Geodetic	1985	1988	1981

OPERATIONAL CAPABILITIES

26. (S) General Considerations. The [redacted] reconnaissance associated space launches may have yielded the Chinese some new intelligence information in addition to systems development data. However, in terms of basic systems capabilities, the Chinese have a number of technological shortcomings that must be overcome before an effective operational satellite capability can be attained. [redacted]

27. (S) Operational Considerations. China's space program, whatever the type and degree of sophistication of the satellite

vehicles themselves may be, will be limited to low earth orbits until they develop improved space launch boosters. We estimate there is an 80 percent chance that the improved space-launch boosters required for 12-hour elliptical or geostationary orbits will become available in 1979-1980.

28. (S) [redacted]

29. (S) The PRC's limited capability to produce long-life electrical power sources also constrains the effective operational life of their satellites. The Chinese are known to have or be working on the capability to produce batteries, thermal generators, fuel cells, and solar cells -- all of which have space applications. They lag behind current U.S. levels of technology to varying degrees in all these areas. However, because much of the technology and equipment for the manufacture of advanced power sources and batteries is accessible and readily available to the Chinese, this gap could be narrowed during the period.

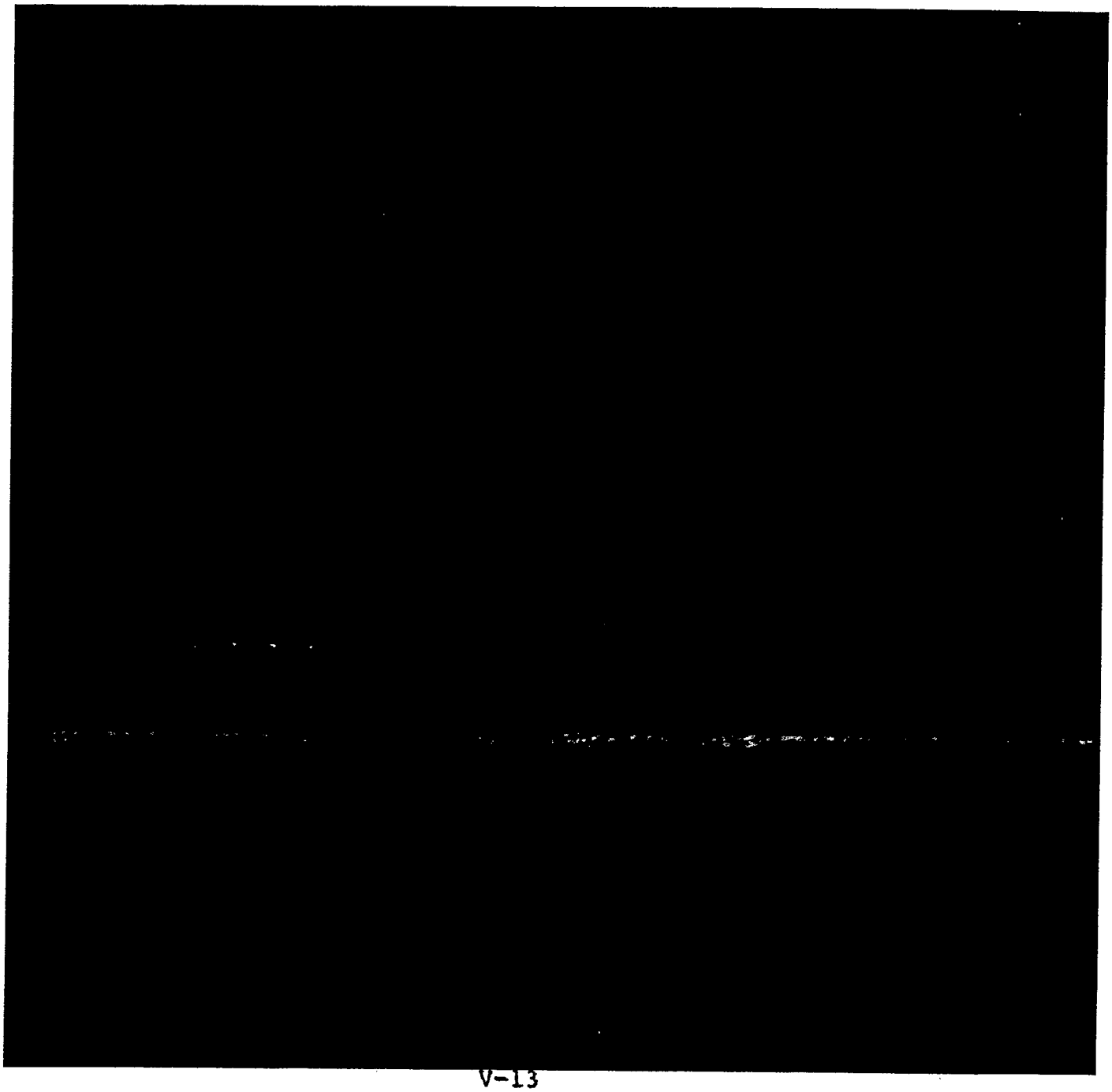
30. (S) We expect in the future that solar cells will be the primary candidate for electrical power on PRC satellites. The Chinese now have the capability to produce solar cells, but available assessments put them from 5 to 10 years behind current U.S. levels of technology in solar cell development.

[redacted] We estimate, therefore, that the Chinese will soon have the capability to produce long-life energy sources for use in space, and could apply them to operational satellite systems within the next 2 years.

SELECTED RELATED REFERENCES

Additional information relative to the subject area of this section can be found in the following selected publications.

GENERAL



SELECTED RELATED REFERENCES (Continued)

[redacted]

TABLE V-1

PRC MILITARY SPACE SYSTEMS - OPERATIONAL LAUNCH RATES a/
(DURING CALENDAR YEAR)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
A. BEST ESTIMATE															
PHOTORECONNAISSANCE															
LOW RESOLUTION	0	0	0	0	0	1	2	3	5	4	4	4	5	5	5
HIGH RESOLUTION	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2
ELINT	0	0	0	0	0	1	2	2	2	2	2	2	2	2	2
COMMUNICATIONS (DOMESTIC)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
METEOROLOGY	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
NAVIGATIONAL	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
R&D/SCIENTIFIC	0	3	2	0	3	4	4	3	1	3	3	2	2	3	3
TOTALS	0	3	2	0	3	6	8	8	9	11	11	12	13	15	15
B. LOW PROJECTION															
PHOTORECONNAISSANCE															
LOW RESOLUTION	0	0	0	0	0	0	0	1	2	2	2	3	3	3	3
HIGH RESOLUTION	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
ELINT	0	0	0	0	0	0	1	1	2	2	3	2	2	2	2
COMMUNICATIONS (DOMESTIC)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
METEOROLOGY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
NAVIGATIONAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
R&D/SCIENTIFIC	0	3	2	0	2	3	2	2	2	2	2	2	2	2	2
TOTALS	0	3	2	0	2	3	3	4	6	6	7	8	8	9	11
C. HIGH PROJECTION															
PHOTORECONNAISSANCE															
LOW RESOLUTION	0	0	0	0	1	2	4	4	4	5	5	6	6	6	6
HIGH RESOLUTION	0	0	0	0	0	0	0	1	2	2	3	3	4	4	4
ELINT	0	0	0	0	1	2	3	3	3	3	3	3	4	4	4
COMMUNICATIONS (DOMESTIC)	0	0	0	0	0	0	1	2	2	2	2	2	2	2	2
METEOROLOGY	0	0	0	0	0	0	1	2	2	2	3	3	4	4	4
NAVIGATIONAL	0	0	0	0	0	0	0	1	1	2	2	3	2	3	2
R&D/SCIENTIFIC	0	3	2	0	3	4	4	4	4	3	3	3	3	3	3
TOTALS	0	3	2	0	5	8	13	17	18	19	21	23	25	26	25

a/ Includes non-operational R&D and scientific launches; excludes launch failures; multiple payloads are taken into account in Table V-2.

TABLE V-2

PRC MILITARY SPACE SYSTEMS - OPERATIONAL SATELLITES IN ORBIT a/
(During Calendar Year)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
a. BEST ESTIMATE															
Satellite Days Per Year															
Photoreconnaissance b/															
Low Resolution	0	0	0	0	0	10-14	20-28	30-42	30-42	40-56	40-56	80-112	100-140	100-140	100-140
High Resolution	0	0	0	0	0	0	0	0	0	0	0	20- 28	20- 28	40- 56	40- 56
Average Number of Satellites in Orbit															
Total	0	0	0	0	0	14-28c/	2d/	3	4	6	6	6	6	6	6
Communications (Domestic)	0	0	0	0	0	0	0	0	1d/	1	2	2	3	3	3
Meteorological	0	0	0	0	0	0	0	0	0	1d/	2	2	3	3	3
Navigational	0	0	0	0	0	0	0	0	0	0	0	1d/	2	3	3
b. LOW PROJECTION															
Satellite Days Per Year															
Photoreconnaissance b/															
Low Resolution	0	0	0	0	0	0	0	10-14	20-28	20-28	20-28	30- 42	30- 42	60- 84	60- 84
High Resolution	0	0	0	0	0	0	0	0	0	0	0	0	0	20- 28	20- 28
Average Number of Satellites in Orbit															
Total	0	0	0	0	0	0	14-28c/	14-28	30-60	30-60	45-90	2d/	2	4	4
Communications (Domestic)	0	0	0	0	0	0	0	0	0	0	0	1d/	1	2	3
Meteorological	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1d/
Navigational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1d/
c. HIGH PROJECTION															
Satellite Days Per Year															
Photoreconnaissance b/															
Low Resolution	0	0	0	0	10-14	20-28	40-56	40-56	40-56	50-70	50-70	120-168	120-168	120-168	120-168
High Resolution	0	0	0	0	0	0	0	10-14	20-28	20-28	30-42	60-84	160-224	160-224	160-224
Average Number of Satellites in Orbit d/															
Total	0	0	0	0	1	2	4	6	6	6	6	6	7	8	8
Communications (Domestic)	0	0	0	0	0	0	1	2	4	4	4	4	4	4	4
Meteorological	0	0	0	0	0	0	1	2	4	4	5	6	7	8	8
Navigational	0	0	0	0	0	0	0	1	1	3	4	5	5	5	5

a/ Includes ~~ASAT~~ scientific satellites, and those satellites that fail to function or achieve intended orbit.

b/ Based on an estimated 10 day to 2 weeks operational satellite life per film capsule; multiple film capsule capability is projected by 1985. After all capsules are deorbited, satellite will remain aloft, but will no longer be operational.

c/ Expressed in satellite days per year based on an estimated 2 to 3 week battery life. After failure of power cell, satellite will remain aloft, but will no longer be operational.

d/ Estimated 1 to 2 year operational satellite life based on success in development of long-life space power sources. The Best Estimate assumes success in 1980; the Low Projection assumes success in 1985; the High Projection assumes success in 1978.

SECRET

TABLE V-3

PRC MILITARY SPACE SYSTEMS -
PROJECTED CHARACTERISTICS AND PERFORMANCE a/

FUNCTION	SYSTEM IOC b/	RESOLUTION	COVERAGE	DATA RETRIEVAL
RECONNAISSANCE				
Low Resolution Photo	1979	3-5 m	4% of earth land mass per mission	Capsule recovery; single capsule
Improved Low Resolution Photo	1983	2-4 m	6% of earth land mass per mission	Capsule recovery; 2 per system
High Resolution Photo	1985	1-2 m	1% of earth land mass per mission	Capsule recovery; 2-4 per system
ELINT	1979	[redacted]	[redacted] selected worldwide coverage every 48 hours	[redacted]
COMMUNICATION				
First Generation	1982	N/A	75-95% coverage of PRC; 300-600 telephone circuits	N/A
Improved Follow-on	1984	N/A	100% coverage of PRC and Southeast Asia; 1-5 TV channels and 300-600 telephone circuits	N/A
METEOROLOGY				
First Generation	1983	1.8-3.7 km	.3-5 microns spectral coverage, daily earth surface coverage between ± 70°	[redacted]
Improved Follow-on	1985	.9-1.8 km	.3-10 microns spectral coverage; continuous earth viewing area coverage	[redacted]
NAVIGATION c/	1985	N/A	N/A	N/A

a/ Not included are R&D/Scientific space launches which, while not "systems," will be utilized for testing components, space power, orientation means, control components, and scientific experiments.

b/ These dates are based on the Most Estimate.

c/ Satellite availability is on the order of every six hours for ship navigation purposes. Accuracy will be on the order of 0.5-1.0 NM.

TABLE V-4

PRC MILITARY SPACE SYSTEMS - CURRENT/PROJECTED SPACE LAUNCH VEHICLES
ESTIMATED CAPABILITIES AND MISSIONS

LAUNCH VEHICLE a/	ESTIMATED PAYLOAD CAPABILITIES (kg) 185 km Circular Orbit	12-Hour Elliptical Orbit	Geostationary Orbit b/	STAGES	WEIGHT AT LIFTOFF kg	PROPELLANTS	AVAILABILITY (IOC)
CSL-1				3			
East Launch	700	No Capability	No Capability		85,500	Liquid	1970
North Launch	500	No Capability	No Capability				
CSL-2				2			
East Launch	3,850	No Capability	No Capability		185,800	Liquid	1975
North Launch	3,000	No Capability	No Capability				
Postulated 3-Stage CSL-X				3			
East Launch	5,500	1,600	No Capability		197,600	Liquid	1979-1980
North Launch	4,700	1,175	No Capability				
Postulated 4-Stage CSL-X				4			
East Launch	Not Used	Not Used	225		205,700	Liquid	1979-1980
North Launch	Not Used	Not Used	No Capability				
Estimated Large Booster				3-4			
East Launch	11,340	Not Used	900		680,400	Liquid/Solid	1988-1990
North Launch	Not Used	Not Used	No Capability				

a/ East Launch produces a "0° satellite inclination; North Launch produces a 90° satellite inclination.

b/ Geostationary payload capability could be significantly increased by using a launch point in southern China.

TABLE V-4

PRC MILITARY SPACE SYSTEMS - CURRENT/PROJECTED SPACE LAUNCH VEHICLES
ESTIMATED CAPABILITIES AND MISSIONS

U.S. a/	ESTIMATED PAYLOAD CAPABILITIES (kg) 185 km Circular Orbit	12-Hour Elliptical Orbit	Geostationary Orbit b/	STAGES	WEIGHT AT LIFTOFF kg	PROPELLANTS	AVAILABILITY (IOC)	POTENTIAL MISSION APPLICATIONS
				3				
	700	No Capability	No Capability		85,500	Liquid	1970	Scientific
	500	No Capability	No Capability					R&D
				2				
	3,850	No Capability	No Capability		185,800	Liquid	1975	Reconnaissance
	3,000	No Capability	No Capability					Scientific
								R&D
[illegible]				3				
	5,500	1,600	No Capability		197,600	Liquid	1979-	Reconnaissance
	4,700	1,175	No Capability				1980	Communications
								Meteorology
								Navigation
								Scientific R&D
[illegible]				4				
	Not Used	Not Used	225		205,700	Liquid	1979-	Communications
	Not Used	Not Used	No Capability				1980	Meteorology
[illegible]				3-4				
	11,340	Not Used	900		680,400	Liquid/	1988-	Communications
	Not Used	Not Used	No Capability			Solid	1990	Reconnaissance
								Scientific R&D

a/ Assumes a "0" satellite inclination; North Launch produces a 90° satellite inclination.

b/ Payload capability could be significantly increased by using a launch point in southern China.

DEFENSE INTELLIGENCE PROJECTIONS FOR PLANNING

APPENDIX A METRIC CONVERSION TABLE

(U) The metric system used in the DIPP is the International System of Units (SI), along with certain non-SI metric units approved by the International Committee on Weights and Measures (ICWM) for use with the SI system. Certain non metric, international customary units, such as nautical mile, degree of arc, and the customary units of time also have been approved by ICWM for continued use with the SI system. US customary units will continue to be employed for items which are defined or named in terms of customary units, such as 1 megaton warhead, 38 caliber pistol and two by four.

(U) In those cases in which the English measurements are rounded, the metric equivalents are rounded. Hence, the metric and English measurements will not be in exact agreement beyond the significant figures.

(U) The accompanying conversion table is provided for the benefit of users who require parametric values expressed in customary units.

To Convert	Multiply by	To Obtain
	UNITS OF LENGTH	
Millimeters	0.0394	Inches
Centimeters	0.03937	Inches
Meters	3.2808	Feet
Meters	1.0936	Yards
Kilometers	0.6214	Miles (statute)
Kilometers	0.5400	Miles (nautical)
Inches	25.4000	Millimeters
Inches	2.5400	Centimeters
Feet	0.3048	Meters
Yards	0.9144	Meters
Miles (statute)	1.6093	Kilometers
Miles (nautical)	1.8520	Kilometers
	UNITS OF AREA	
Square centimeters	0.1550	Square inches
Square meters	10.7639	Square feet
Square meters	1.1960	Square yards
Square inches	6.4516	Square centimeters
Square feet	0.0929	Square meters
Square yards	0.8361	Square meters
	UNITS OF MASS	
Kilograms	2.2046	Pounds (avoirdupois)
Metric tons	1.1023	Short tons
Metric tons	0.9842	Long tons
Pounds (avoirdupois)	0.4536	Kilograms
Short tons	0.9072	Metric tons
Long tons	1.0160	Metric tons
	UNITS OF VOLUME	
Liters	0.2642	Gallons
Cubic meters	35.3147	Cubic feet
Gallons	3.7854	Liters
Cubic feet	0.0283	Cubic meters